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VITAMIN A DEFICIENCY IN FARM ANIMALS*

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The early investigations on vitamin A deficiency were concerned mainly with human subjects or with small laboratory animals, such as the rat, which could conveniently be restricted to synthetic diets. Symptoms resembling those of vitamin A deficiency, however, were soon recognised under field conditions in farm animals receiving poor diets. In experiments designed to reproduce these symptoms and to prove that they are due to deficiency of vitamin A and not to the well-recognised inadequacy of the diets in other nutrients, considerable practical difficulties have had to be faced. Since it would be both difficult and expensive to maintain such animals on fully synthetic rations, the diets chosen by most workers were made up of natural fodders with a low carotene content. The adequacy of these diets in regard to other nutrients was checked by their ability to allow normal growth and health when supplemented with carotene or vitamin A.

A short review will be given of some of these experiments and the symptoms of vitamin A deficiency observed in each species will be discussed separately.

CATTLE

General

As far back as 1896 it was observed that stall fed cattle frequently developed symptoms which have since been recognised as those of vitamin A deficiency. Thus, Connell & Carson (1896) described a condition termed "fat sickness" which was often accompanied by inflammation of the eye or total loss of sight. Not only stall fed cattle, but also cattle on range may suffer from this deficiency during a dry season when the vegetation is likely to have a low carotene content. Hart & Guilbert (1933) noted that in cattle grazing on the California ranges the degree to which the deficiency was manifested varied according to the length of the drought period. Under natural conditions, however, a single deficiency uncomplicated by other factors rarely occurs. Guilbert & Hart (1934) therefore decided to study the symptoms of vitamin A deficiency under controlled conditions. When steers, nine to 20 months old, were restricted to a diet lacking in vitamin A, they first developed night blindness, followed by facial paralysis and muscular inco-ordination. Mild diarrhoea, loss of appetite and a roughness of the skin also occurred. In the later stages of deficiency the animals failed to thrive and their weight rapidly declined.

Keratinisation of the epithelial cells during vitamin A deficiency is a common symptom in the rat, but it has been reported less frequently in cattle. Symptoms of secondary infection, presumably following keratinisation, have been mentioned by various workers. Thus, Mead & Regan (1931) demonstrated typical xerophthalmia in calves raised on diets without roughage. In Spain, Sanchez (1933) and also Schieblich (1934) described a similar condition. Xerophthalmia has also been reported by Kuhlman, Gallup & Weaver (1936) in calves kept on a diet low in vitamin A. Other secondary infections, especially in the intestinal and respiratory tracts, have also been noted and pneumonia is often the actual cause of death in vitamin A deficiency (Moore, L. A., 1941). Kidney infections have been reported by Moore & Hallman (1936) and nephritis may be the cause of the oedema of the legs (Bechdel, Honeywell & Dutcher, 1928; Guilbert & Hart, 1935) which is often found in animals kept on a deficient diet. Madson & Earle (1947) have recently made an extensive study of this condition, which they produced experimentally by giving a diet low in carotene containing either beet pulp and white maize or consisting mainly of yellow maize. The development of oedema was associated with an increase of the plasma globulin and a decrease of the albumin, although this change did not seem to be sufficient to account for the oedema.

Reproduction

The importance of vitamin A in reproduction has also been recognised. Thus, Meigs & Converse (1932) reported that dairy cows kept on a diet containing roughage of poor quality gave birth to prematurely dead or weak calves. Many of the animals were also born blind. Hart & Guilbert (1933) investigating a severe outbreak of vitamin A deficiency in California, found that 75 per cent. of the cows failed to carry pregnancy to a successful completion and all the calves born from the remaining dams were weak, had severe diarrhoea and died in one to five days. Similar results were obtained by Davies & Madson (1941) on animals kept on low levels of carotene.

In milder forms of vitamin A deficiency, the ability of bulls and cows to breed is not necessarily lost. Animals have been observed to carry out these functions satisfactorily even in instances when they were completely night blind. Muscular inco-ordination preceded changes in spermatogenesis and the bulls retained an unusual degree of libido even after they were unable to stand. These animals also proved to be satisfactory for artificial insemination purposes (Madson, Eaton, Heemstra, Davies, Cabell & Knapp, 1948). In the later stages of deficiency, however, degeneration of the seminiferous tubules has been reported (Guilbert & Hart, 1935). In the testicles of one of the experimental animals that died of the deficiency, no spermatozoa were found, but this cessation of spermatogenesis did not appear to be permanent, since when animals were cured of the deficiency their semen contained motile spermatozoa which produced normal offspring. Essentially similar results were obtained in later experiments and for

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a summary of the literature see Bratton, Salisbury, Tanabe, Branton, Mercier & Loosli (1948). These workers also carried out detailed studies on impaired spermatogenesis and reported that during the course of vitamin A deficiency, although the total number of spermatozoa per ml. remained unchanged, the percentage of abnormal spermatozoa increased and the number of motile spermatozoa decreased. At slaughter, histological examination of the testicles showed degeneration of the germinal epithelium of the seminiferous tubules and evidence of general impairment of spermatogenesis. The abnormalities could be prevented or cured by dosing the animals with carotene.

Diseases of the young calf.

The possibility that the lack of vitamin A is a predisposing factor in the white scour disease of new-born calves has been suggested by Stewart & McCallum (1938), who reported that calves receiving colostrum of low vitamin A content were more liable to infections such as white scour and navel ill than animals receiving colostrum rich in the vitamin. Claims have also been made by the Wisconsin workers (Phillips, Lundquist & Boyer, 1941 ; Lundquist & Phillips, 1943 ; and Hansen, Phillips & Rupel, 1946) that the onset of white scour could be prevented by the administration of massive doses of vitamin A and that this treatment also prolonged the survival time of the calves. In contrast to these observations Blakemore, Davies, Eylenburg, Moore, Sellers & Worden (1948), Hibbs & Krauss (1947), Norton, Eaton, Loosli & Spielman (1946), Nevens & Kendall (1947), Erb, Scott, Norton & Morrow (1949) have been unable to find a significant improvement in the well-being of calves receiving vitamin A supplements. The conflicting results obtained by various workers may have been caused by the different prepartum diets used or other differences in feeding ; recently it has been suggested that vitamin A is only active in preventing scours if lecithin is also included in the diet (Esh, Sutton, Hibbs & Krauss, 1948). Breed difference may also account for the varying results obtained ; Ayrshires, Jerseys and Guernseys appear to be more susceptible to white scour than Friesians. On the other hand, experiments in this country have shown that the protective action of colostrum is independent of its vitamin A concentration. Aschaffenberg, Bartlett, Kon, Terry, Thompson, Walker, Briggs & Cotchin (1948) ; and Aschaffenberg, Bartlett, Kon, Walker, Briggs, Cotchin & Lovell (1949) fractionated colostrum in a Sharples centrifuge and fed the fatty fraction and the non-fatty fraction to two groups of calves. They observed not only that the fatty fraction containing the vitamin A failed to protect the calves against white scour, but also that even small amounts of the non-fatty fraction reduced the incidence of scours and prolonged the survival times of the calves. Blakemore, *et al.* (1948) tackled the problem from a slightly different angle. They used precolostrum which has a low vitamin A and fat content when compared with colostrum, but is a rich source of globulins and antibodies. When calves, which were denied colostrum and kept on skim milk, were injected subcutaneously with small amounts of precolostrum (10 to 40 ml.) they invariably survived the first 14 days of life, whereas all controls receiving no precolostrum but massive doses of vitamin A died within seven days. These experiments support the previous hypothesis of Howe (1921), Orcutt & Howe (1922) and Smith & Little (1922) that the protective substance of colostrum is probably a globulin which assists in building up the immunity of the young calf. Smith (1948) has recently reviewed the literature on the isolation of these proteins from colostrum and milk and their role in the immunity of the calf.

Blindness in growing cattle

Bechdel *et al.* (1928) reported blindness in one out of five animals on a ration deficient in vitamin A. The eye lesions observed by Hart & Guilbert (1933) in a severe outbreak of deficiency varied from slight clouding of the cornea to extensive keratitis, ulceration of the cornea, loss of aqueous humour, lens opacity and shrinking of the eyeball with complete and permanent blindness which could not be cured by the ingestion of vitamin A. There has been some difference of opinion as to the cause of this form of blindness, because it also occurred under circumstances in which vitamin A deficiency was not suspected, and in such instances other possible causes such as Rickettsial infections have been suggested. The case reported by Crocker (1919) was considered to be the result of a rachitic condition, but was in fact probably due to a lack of vitamin A.

De Schweinitz & De Long (1934) described a similar eye lesion under the name of papilloedema or choked disc and suggested that the defect might be hereditary. Moore, Huffman & Duncan (1935) studied 24 cases in which this condition occurred, but concluded that since the lesions differed from xerophthalmia observed in vitamin A deficiency, some factor other than lack of vitamin A was responsible for their occurrence. In 1936 Kuhlman *et al.* reported both xerophthalmia and the above type of permanent blindness in calves on a diet low in vitamin A. Hart & Guilbert (1937) succeeded in producing cases of blindness experimentally by keeping animals on a diet deficient in vitamin A, but adequate in other respects. The deficient animals showed widely dilated pupils and a characteristic greenish coloration of the retina when viewed through the cornea with the animal facing the light. There was pinching off and degeneration of the optic nerves where they passed through the optic canals in the sphenoid bone due to stenosis of the walls of these canals. In 1939 Moore reported further experiments on this blindness in calves and in the light of his own work and that of others, reconsidered his previous view and agreed that this type of permanent blindness was a real case of vitamin A deficiency. The symptoms exhibited by the animals kept on a low carotene ration were nyctalopia, papilloedema and permanent blindness. One of the experimental animals that went blind in one eye was dosed with carotene ; this prevented blindness in the other eye, but did not cure the one already blind. Papilloedema could also be cured with carotene. *Post-mortem* examination of the blind animals also revealed stenosis of the optic canal and constriction of the optic nerves. Moore (1939) suggested that the bony malformation was probably due to an increased cerebro-spinal fluid pressure, the occurrence of which was confirmed in later experiments (Moore & Sykes, 1941). These workers at first suggested that in young animals this increased pressure may be caused by an overgrowth of the central nervous system. Such an overgrowth of the brain tissue has been reported for rats (Wolbach & Bessey, 1940). Later studies of Moore (1941) on adult bovines, however, did not support this hypothesis. Animals that were put on a diet low in vitamin A when their brains were fully formed also developed increased pressure with consequent papilloedema. Another possible cause of this increased pressure may be perivascular oedema of the brain tissues. Evidence of such oedema has actually been presented in

cases of blindness reported by De Schweinitz and De Long (1934).

Although Mellanby (1944) studied the effect of vitamin A deficiency on bone and nervous tissue in laboratory animals, blindness in growing cattle as observed in America has, until recently, not been investigated in this country. During the past few years, however, several cases of blindness in the field have been reported (Blakemore *et al.*, 1948). That this might be attributable to vitamin A deficiency was suggested by the analyses of the diets and also by the *post-mortem* finding that the optic nerves were constricted. In experiments not yet published, which were undertaken to elucidate this point, Blakemore, Eden, Kodicek, Moore & Sellers fed 12 castrated male calves on diets similar to those used on the affected farms which consisted of sugar-beet pulp, straw and cattle cake. Some animals received in addition regular doses of vitamin A acetate. Weekly examination of the blood showed a steady decrease of the vitamin A levels in the unsupplemented group, and the absence of vitamin A reserves in the liver was confirmed at slaughter. Other symptoms of vitamin A deficiency such as night blindness, convulsions and increase of cerebro-spinal fluid pressure also were noted. Ophthalmological examinations revealed papilloedema with the onset of vitamin A deficiency and eventually as the condition advanced, deformities became apparent in the conformation of the skulls. One of the deficient animals became completely blind whilst in contrast, the group receiving vitamin A increased in weight, had normal vitamin A levels and showed good general condition.

Sheep

In the experiments of Guilbert, Miller & Hughes (1937) sheep maintained on a diet deficient in vitamin A and consisting of beet pulp, cotton-seed meal, barley and wheat bran developed night blindness, but daylight vision was not impaired. Other manifestations were loss of appetite, muscular weakness and convulsions, while at *post-mortem* examination evidence was found of pneumonia and enteritis. Similar symptoms have been reported in later experiments by Schmidt (1941) and by Peirce (1945).

The reproductive functions of the sheep are also affected by lack of the vitamin. Hart & Miller (1937) experimented with ewes that were night blind at conception and kept on a diet low in vitamin A during pregnancy. All the lambs were born dead or died within 24 hours. Seminal degeneration in animals that were night blind has also been reported by Gunn, Sanders and Granger (1942). The degenerative changes could be prevented or cured by the administration of vitamin A.

Goats

Goats on a diet deficient in vitamin A exhibit symptoms similar to those found in sheep. Schmidt (1941) observed night blindness, loss of appetite and loss of weight, but convulsions did not occur. Urolithiasis was the cause of death in many instances. Administration of carotene, however, did not invariably prevent calculus formation although this occurred less frequently in animals receiving carotene supplements than in those on the basal diet alone.

Horses

Although the diet of horses on farms is generally adequate in carotene, it may be poor in this respect under urban conditions. In Finland, Klemola (1933) claimed that faulty hoofs in army horses were due to vitamin A deficiency. The scaly secretions of the perioptic band, which in places formed a thick spongy crust, changed to a normal thin shiny layer when the animals were allowed to graze or after the administration of silage or cod liver oil. Other workers, Chatelain (1933) and Kesler & Callends (1938) also claim to have observed vitamin A deficiency in army horses kept on a ration of straw and hay. Mitcnell (1936) considered that, whilst definite proof of deficiency in the horse was lacking, the high percentage of abortion in the mare and some of the commoner diseases such as rheumatism might be due to vitamin A deficiency. Edwards (1937) supported this hypothesis; Skackov (1940), on the other hand, found that neither carrots nor cod liver oil had any effect on abortions in mares, and others (Hart, Goss & Guilbert, 1943) considered that joint lesions were not due to vitamin A deficiency. Experimental vitamin A deficiency has been produced in horses by Guilbert, Howell & Hart (1940), who observed night blindness, and roughness of the skin, but no convulsions. Impaired day vision and clouding of the cornea occurred in some animals and ophthalmological examination showed that this was caused by keratinisation, but no cases of papilloedema were observed.

Pigs

General

As early as 1914, Hart & McCollum (1914) showed that when wheat kernel was the only food supplied pigs developed stiffness of the hindquarters followed by paralysis. Blindness developed in some animals and their general condition was poor. At the time it was thought tnat these symptoms were probably due to a toxic factor in the wheat kernel although the possibility of a vitamin A deficiency was also suggested, as animals kept on an identical diet but supplemented by milk, egg yolk or alfalfa did not develop the above symptoms. The paralysis was later shown by Hughes, Lienhardt & Aubel (1929) to be caused by nerve degeneration.

The first extensive work on this form of paralysis in pigs in this country, was carried out by Dunlop (1935) who not only obtained symptoms essentially similar to those described by previous workers, but clearly demonstrated that they were caused by lack of vitamin A. The basal diet fed to the animals was one recommended for pig keeping in this country, whereas the control animals received an additional supply of vitamin A. Chemical analysis showed that the basal diet was deficient in vitamin A and also that the livers of the non-supplemented group had negligible reserves of vitamin A as compared with the control animals. Dunlop's work was confirmed and extended by Foot, Henry, Kon & Mackintosh (1939), who showed that pigs receiving supplements of 0·5 per cent. to 2 per cent. of cod liver oil in their diet made good progress, while controls on a meal mixture alone failed to thrive; the symptoms exhibited included loss of appetite, cessation of growth accompanied by an abnormal gait, convulsive fits and finally nervous collapse. The animals were not tested for night blindness, but showed impaired vision in the daylight. *Post-mortem* findings include evidence of pneumonia and inflammation of the intestines in some of the animals.

Reproduction

If sows are kept on a suboptimal vitamin A intake reproduction will be normal but the piglets show diminished vitality at birth with a consequent high mortality rate (Nordfelt, 1944-45). In cases of severe vitamin A deficiency, as in cattle and sheep, the reproductive functions are

also impaired. Under such conditions gestation fails and resorption of the foetus is common (Hughes, 1934). Interesting experiments on the necessity of providing adequate vitamin A to ensure proper embryonic development were carried out by Hale (1937), who kept gilts on a diet deficient in vitamin A for 150 to 200 days before breeding and during the first 30 days of gestation. The formation of the eyes in the pig foetus is completed by this time. After this stage the diet was supplemented with cod liver oil in order to make successful termination of the pregnancy possible. The offspring of the sows treated in this way, were blind owing to anophthalmous or microophthalmus. They also showed other malformations such as accessory ears, cleft lip and palate, subcutaneous cysts and misplaced kidneys. Cases of anophthalmous in newborn piglets have also been observed in Cambridge (Blakemore & Eden, unpublished). The dietary history of the sows was similar to that described by Hale. Detailed study of the histology and embryology of this condition has been made by Warkany & Schraffenberger (1944) using the rat as the experimental animal. Warkany considers that the malformation of the eye is caused by an arrested development. The condition also resembles the fibroplasia found behind the lenses of some premature infants (Terry, 1942).

Poultry

General

Emmett & Peacock (1923) demonstrated in 1923 that vitamin A was also essential for avian nutrition. With the development of vitamin A deficiency the animals became weak and showed emaciation. Other symptoms noted were staggering gait, inco-ordination and ruffled plumage. Keratinisation of the upper respiratory and digestive tract (Seifrid, 1938) and of the third eyelid (Jungherr, 1945) has also been reported. Jungherr (1945) considers that keratinisation of the nasal passages is one of the earliest symptoms of vitamin A deficiency and he has successfully developed a technique using nasohistopathological examinations for detecting subclinical vitamin A deficiency in commercial flocks. Keratinisation of epithelial cells predisposes the animals to secondary infections. Thus, several workers have observed xerophthalmia in older animals (Emmett & Peacock, 1923 ; Beach, 1924) and at autopsy evidence of other symptoms of secondary infections such as oesophageal pustules has also been noted (Temperton & Dudley, 1947 ; McClymont & Hart, 1948). In birds exhibiting extreme symptoms of deficiency the kidneys show degeneration (Cruickshank, Hart & Halpin, 1927) which is associated with high uric acid content of the blood (Elvehjem & Neu, 1932). *Post-mortem* examination reveals accumulation of urates in the renal tubules and sometimes on the surface of the heart, liver and spleen (Cruickshank *et. al.*, 1927 ; Elvehjem & Neu, 1932 ; Capper, McKibben & Prentice, 1931).

Reproduction

Although there is a general agreement that egg production is impaired during vitamin A deficiency (Rubin & Bird, 1942 ; McClymont & Hart, 1948) it is not as yet established that hatchability is adversely affected. Sherwood & Fraps (1932) used different proportions of yellow and white maize to vary the intake of vitamin A precursors and observed improved hatchability in the group receiving a higher proportion of yellow maize ; they concluded from these results that vitamin A was the active factor but found no close correlation between the amount of vitamin A in the eggs and the ability of the chicks to hatch. Rubin & Bird (1942) and McClymont & Hart (1948) were unable to confirm a decreased hatchability in vitamin A deficiency and criticised the experiments of Sherwood and Fraps (1932) on the ground that the rations used were deficient in riboflavin which has since been proved essential for hatchability (Lepkovsky, Taylor, Jukes & Almquist, 1938). The eggs of vitamin A deficient hens are low in vitamin A (Bethke, Kennard & Kik, 1925) and the mortality rate of the chicks hatched from such eggs is much higher than in chicks from eggs containing larger amounts of vitamin A when the rearing ration is low in the vitamin (Temperton & Dudley, 1947 ; McClymont & Hart, 1948).

Comparison of Symptoms of Deficiency as Observed in Various Species

Although the symptoms of the final stages of deficiency vary from species to species, there is a certain similarity in the primary effects.

Night blindness is probably one of the earliest manifestations of lack of vitamin A in the diet, but it is likely to escape notice unless the animals are specially tested for it. Keratinisation of the epithelial cells and a consequent decreased resistance to infection have also been recorded for most species.

In the later stages of deficiency, muscular inco-ordination is common, and may at first be caused by an increased cerebro-spinal fluid pressure. In " swine paralysis," however, actual degeneration of the nerves has been observed. Damage to the optic nerve is also found in cases of permanent blindness in young cattle.

Impairment of the reproductive function generally occurs only in advanced stages of deficiency, when the animals are already unthrifty. Before reaching this stage, however, the farmer is either likely to kill the animal or to feed vitamin A supplements to cure the deficiency and hence impaired reproductive function due to lack of vitamin A is rarely encountered in the field.

Vitamin A Requirements, Storage and Depletion of Reserves

The daily requirements of vitamin A recommended for an animal vary according to the nutritional aim in view. The amount just necessary to prevent overt signs of deficiency disease is certainly less than that required to maintain normal health. In young animals the requirements may be determined by estimating the amount of vitamin A necessary to allow maximum growth to take place on an otherwise synthetic diet. For adults, rations containing enough vitamin A to avoid gross clinical symptoms of deficiency were at first considered satisfactory. Nowadays more refined methods usually are employed for detecting low vitamin A status of animals and usually the concentrations of carotene and vitamin A in the blood are used as an index of this. Moore, Sykes, Jacobson & Wiseman (1948) claim that the determination of cerebro-spinal fluid pressure in bovines is an even more sensitive guide, as increased pressures are observed before the level of vitamin A in the blood falls.

The requirements are further dependent on the weight and age of the animals and are considerably increased during gestation and lactation.

The form in which vitamin A is given is also important. Generally the requirements are higher when carotene is fed instead of preformed vitamin A and this may be partly due to poorer absorption of the carotene (Booth, 1947 ;

Callison, Orent-Keiles, Frenchman & Zook, 1949). The composition of the basal diet also may modify the amount of vitamin A required ; factors aiding absorption such as lecithin (Esh and Sutton, 1948) lower the requirements, whereas unsaturated fatty acids raise the requirements by favouring oxidative destruction of carotene and vitamin A (Drummond, Ahmed & Morton, 1930). Antioxidants exert a sparing action on this process (Quackenbush, Cox & Steenbock, 1942) and some of these substances such as tocopherol and ascorbic acid are present in the natural foodstuffs. Special fortification of the rations is also a common practice especially if carotene is added in oil (Dyer, Key & Coward, 1934). It is found that some of the antioxidants continue to exert their protective action even after ingestion of the food. They may do this by inhibiting oxidation in the alimentary tract (Guggenheim & Hock, 1944 ; Hickmann, Kaley & Harris, 1944 ; Miles, Erickson & Matill, 1949) and there is some evidence that tocopherol, at any rate, carries on its protective function even after absorption (Davies & Moore, 1941 ; Lemely, Brown, Bird & Emmett, 1947).

All these factors make it difficult to compare the vitamin A requirements advocated by various workers. In Table I the requirements for various species are divided into two groups. Minimum requirements are those which will prevent the occurrence of gross clinical symptoms and will allow good growth to take place without supplying much for liver storage. The second group gives optimal figures where the quantity of vitamin A is sufficient to allow the building up of the reserves in the liver as well.

It will be seen, however, that when the requirements have been determined under similar experimental conditions (*i.e.*, by the same workers) and are expressed on a basis of bodyweight they are about the same for widely divergent species.

Depletion of reserves

The time taken to exhaust the reserves of the vitamin is dependent not only on the initial size of the reserve but also on the rate of utilisation of the vitamin by the body. This rate is increased in growing animals and also in animals where the basal metabolic rate has been raised as in hyperthyroidism (Johnson & Baumann, 1948). Hickmann (1946) suggested that the rate of depletion is also dependent on the actual size of the initial reserve. This hypothesis has been confirmed by Frey & Jensen (1946 and 1947), who showed that for steers the rate of depletion decreased as the amount of vitamin A in the liver decreased.

This rate of depletion of large reserves is greater than can be accounted for by the needs of the body. It seems that there are two ways in which vitamin A disappears from the liver. The reserves are only partly used for the normal physiological processes of the body and there also seems to be a mechanism for destroying vitamin A when stored in excessive amounts. This problem has been investigated by Popper & Brenner (1942), who used fluorescent microscopy for locating vitamin A in the liver cells. They suggest that the destruction of excessive vitamin A probably takes place in the Kupffer cells. Normally, vitamin A is stored in the other liver cells but when

Table I

Vitamin A Requirements of Various Species

Species	Age	Vitamin A requirements (i.u. per kg. of bodyweight per day)				References
		Minimum requirements		Optimum requirements		
		Vitamin A*	Carotene†	Vitamin A*	Carotene†	
Bovine ...	Adults	22·5	—	68	206	National Research Council, 1945*a*
" ...	"	21–27	43–55	—	—	Hart, 1940
" ...	"	—	—	—	206	Hauge *et al.*, 1944
" ...	"	—	—	—	254	Moore *et al.*, 1948
" ...	Calves	39	—	51	—	Boyer *et al.*, 1942
" ...	"	32	—	250	—	Lewis & Wilson, 1945
Sheep ...	Adults	—	—	—	168	National Research Council, 1945*b*
" ...	"	17–26	42–58	—	—	Hart, 1940
" ...	"	—	82–92	—	—	Peirce, 1946
Pigs ...	"	—	—	—	150	National Research Council, 1944
" ...	"	17–24	42–65	—	—	Hart, 1940
" ...	"	22	67	—	—	Braude *et al.*, 1941
" ...	"	—	—	—	134–166	Hale & Fraps, 1941
" ...	Young	—	—	—	83–100	" " "
" ...	"	—	—	—	316	Ellis, 1945
Horses ...	Adults	17–24	33–50	—	—	Hart, 1940
Rats ...	"	18–22	25–33	—	—	Guilbert *et al.*, 1940
" ...	"	25–35	—	300	—	Lewis *et al.*, 1942
" ...	"	—	—	100	—	Paul & Paul, 1946
Human ...	Adults‡	18	—	36	107	Medical Research Council, 1949
" ...	"	28	71	—	—	Wagner, 1940
" ...	"	28	—	—	—	Nylund, 1944
" ...	"	—	—	40	46–99	Callison & Orent-Keiles, 1947
" ...	Children	20–35	—	—	—	Lewis & Haig, 1935

* Values given in μg. have been multiplied by 2·8 to convert them into i.u.
† Values given in μg have been multiplied by 1·66 to convert them into i.u.
‡ 70 kg. has been taken as the average weight of human adults and requirements not expressed on a basis of bodyweight were converted using this factor.

massive doses are given the Kuppfer cells also show intensive fluorescence characteristic of vitamin A. During depletion, as far as can be judged by fluorescence, the Kuppfer cells are the first to give up their vitamin A.

This decrease of fluorescence is not accompanied by an increased concentration of vitamin A in the blood, hence the evidence suggests that the disappearance of vitamin A from the Kuppfer cells does not represent a release of the vitamin into the blood, but that is actually being destroyed in these cells. The experiments of Moore, Martin & Rajogopal (1939) and others show that vitamin E has a sparing action on the vitamin A reserves of the body as these reserves are depleted faster in vitamin E deficient animals than in control ones (For the review of literature see Moore, 1945 ; Hickman & Harris, 1946).

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Weekly Wisdom

The theory of evolution, the body of concepts which subsumes the various facts and gives a coherent naturalistic explanation of them, has in the last 25 or 30 years been much developed, thanks to advances in genetics, taxonomy, ecology, paleontology, and mathematical selection theory, and is now more than ever the pivot of general biology.—Julian Huxley.

CRUELTY TO ANIMALS IN NORTH AFRICA

By

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Probably very few of the members of our profession in Great Britain realise the extent and the severity of the cruelty which is inflicted upon animals in North Africa. The cruelty arises from a number of causes chief of which are:—

1. An entire lack of sympathy or understanding for any suffering in an animal.
2. Poverty, and thus inability to replace a sick or injured animal, with the consequence that the unfit are forced to continue work until they either collapse or die.
3. The absence of any law to repress cruelty, and the general apathy and disinterest of authorities to formulate even local regulations.
4. The fact that not all towns possess a qualified veterinary practitioner; and even if they did, their services would not be sought.
5. If veterinary aid was needed in the outlying villages, the great intervening distances would involve long and arduous journeys, even if a practitioner could be employed with any prospect of emolument.

Every transport animal (donkey, mule or camel) invariably is doomed from birth to a life of misery and torture, for it contends not only with the pitiless sun, heat, fly pests, and lack of water, food and rest but also with the appalling callousness and deliberate brutality of its owner.

People in England who talk so loudly of cruelty and raise such a furore because a veterinary surgeon may not be found on duty on a Christmas day or a Sunday, have really never known what cruelty is until they have seen it in North Africa, as I have.

It makes an animal-lover's heart bleed to see a diminutive little donkey being loaded up with bags of sand, one after another, until its legs begin to bend, and it can hardly stand, let alone walk. Then, as it tires, it is goaded from behind by a nail in the end of a stick, or battered with a stick where it hurts most. When it is fatigued beyond endurance, and gasping for water, there is no thought of resting it, or finding a shaded place, or offering a drink. On the contrary, the likelihood is that the tiring Arab will also climb on.

I have removed pack saddles (so-called) from these poor creatures which were literally stuck to the skin, and disclosed huge suppurating sores, sometimes as large as a meat dish. Not infrequently, these are filled with hundreds of maggots which literally eat away the flesh.

In the fondouks (corresponding to our livery stables) it would be a rare occurrence to see any attendant remove the animal's saddle for the night, much less clean the animal's skin or bathe its wounds. Litter on the ground would be a luxury and, indeed, superfluous in view of the "amiable" common practice of tying the legs together (back and front) ostensibly to prevent the poor beast from kicking. They are too tired and listless for that.

On one occasion, after being disturbed all night by the continuous braying of a mule, behind my hotel in Tangiers, I went out at 6 a.m. to investigate. The fore-legs of this mule were tied tightly together, and the hind legs similarly tied, so that the mule could not even rest a leg, let alone lie down, and soon, another gruelling day was to start all over again.

What hope is there for these poor ill-treated creatures? It seems to lie in the efforts of the S.P.A.N.A. (Society for Protection of Animals in North Africa), a subsidiary of the R.S.P.C.A. Through lack of funds, the society is unable to give paid employment to more than a few devoted workers on the spot, but through gifts and prizes, and in other ways, it induces quite a number of people scattered over the north African continent to afford relief, as and when they can, to the multitudes of tormented living creatures in need of it.

The society does much also through the schools, by way of educating the children to a better appreciation of animals; it enlists the support of the police and of such French veterinary surgeons as will co-operate; it also sends out drugs and appliances from home.

As the honorary veterinary surgeon to this society, I have received recently a report of the last visit to Morocco and Algeria of Dr. Vinter (Chairman) and Mrs. Valentine (Vice-Chairman). Following are interesting extracts:—

". . . At Casablanca we saw Mdme. Constillière by appointment, and she took us to the animal dispensary. This was clean and contained 14 donkeys, a horse and a camel under treatment. There are also good kennels and an exercise yard for dogs, an office with a telephone, and decent quarters for the Arab custodian Mohamed. So far as it goes this fondouk is good, and Mohamed, who has a car of his own, gives treatment in the markets and fondouks, the society paying for his petrol. The fondouk is municipal property and animals are sent in by the police, the owners having to pay for the food. Mohamed is paid 12,000 francs a month by the society."

In recent months S.P.A.N.A. has sent out to Mme. Constillière two gifts each of £20 for the erection of water troughs. . . . " At Marrakech we spent much of our time with M. Mastey . . . to whom we must be ever grateful for keeping the work of S.P.A.N.A. going after the death of Mr. Hosali. M. Mastey acts as financial adviser to the Pacha of Marrakech—a poker-faced old gentleman who wears a burnous over clothes bought at Harrods. . . . The Pachas of Fez and Marrakech are the principal and very powerful Arab civil authorities. The Pacha promised to give all possible help to our animal protection work. . . . Mohamed was summoned to appear and he did his bit very nicely, kneeling in a spotless burnous to kiss the Pacha's right knee. On our request the Pacha signed an authorisation for Mohamed to carry with him, and notice of this authorisation was sent out by private messenger to all the Caids and Khalifas. In this way the backing of the Arab police is secured.

" Mohamed is a small-built Arab who has animal protection deeply at heart. . . . Droughts drove him to sell up all his land except for 13 olive trees, and he longs for the day when he can buy back a little land and so acquire the Arab equivalent of a bank balance. . . . His wife, before her death, insisted on his marrying again, and his second wife is a charming child of 12. . . . At Ait Ourir market we went into a mud and wattle hut carpeted with palm leaf matting where we had a glass of sweet, weak coffee followed by an Arab cake made with yeast and fried in oil. Mohamed and his assistant ate cooked goat's flesh with their fingers.

" I paid my respects to the Khalifa and smuggled into his palm 200 francs. He was delighted and gave me to drink his half-drunk glass of mint tea.

" In this area donkeys are all shod with ready-made cold shoes, and the Arab bit is in use for horses and mules. Most of the donkeys are guided and goaded along without

the use of bits. Goading is universal and of the 300 wounded donkeys treated in one day at Ait Ourir market, a high proportion were injured by goading and not by the rubbing of harness. The way the animals were tied up to prevent them straying was most cruel. The forelegs of some donkeys were tied so tightly together that swelling was caused, and we saw three goats tied tightly together with one foreleg over the other. . . .

" The cab-horses in Marrakech are in a bad state ; nearly all are lame. The Government veterinary surgeon inspects them, but he cannot condemn the whole lot and has to pass many which are unfit. . . . The man in charge of the dogs in the fourrière was hosing the cages with the dogs in them so that they were getting wet through. . . . In cold weather this is abominable. Dogs are killed by the veterinary surgeon by strychnine injection after five days. . . . There was no litter."

Miss Nina Hosali, the Hon Secretary of S.P.A.N.A., spent two months in Tunisia this year, and the following are extracts from her letters home: ". . . during this time I visited all our fields of work. In addition to the numerous social and official contacts which are a necessary feature of such visits, I spent long days in fondouks and markets . . . where I was able to see at first-hand the actual condition of the animals and the reactions and outlook of the natives. . . . At Tunis the committee was much concerned over a projected decree against overloading. . . . Everyone agrees as to its necessity and the police themselves say they would welcome some definite guidance to help them in making convictions. In practice it is proving extremely difficult to know how to frame the decree. . . . Some of the cab-horses in Tunis struck me as terribly thin on my arrival, but much less so on my departure as by then I had probably got acclimatised to seeing thin animals. . . . Many cab horses are well fed and in excellent condition, but there is a rumour that licenses are taken out only for the good ones, and that the others are hidden away when the animal inspection takes place. . . . The police were to be instructed to keep a special watch at night when the worst horses are brought out. . . .

" The advent of rain in North Africa is immediately reflected in increased prosperity and plenty for both man and beast. I was indeed thankful to see a green mantle covering tracts of land which in 1947 looked like an endless sea beach, but as I travelled about the country I realised how few sheep and goats there were, nearly all having perished in that terrible four years' drought, except for a remnant driven into Algeria and sold for practically nothing. The fondouks in Tunis are combed by our dresser, Ben Larbi, who takes a different section of the town each day in rotation. This, together with our hospital, keeps the town animals in reasonably good condition. There is, however, an enormous field for work in the country markets at one or two hours' distance from Tunis by car or train. . . The heavy baskets of drugs and dressings are never too much for Marie Preste, and no amount of nauseating filth can deter her from exploring every corner of every fondouk. . . .

" At most of the places visited, we called on the local officials—Caid, Khalifa, Police or gendarmes, Schoolmasters, etc.—in an attempt to make them animal-protection-minded. . . . Diplomas and prizes were awarded to French and Arab policemen who had distinguished themselves by being particularly zealous with regard to cruelty cases. . . . At all the markets there were a number of very poor Bedouins from the surrounding country, some almost naked and scarcely able to hang on to the last shred of their rags. The weather was rainy, windy and cold ; much of the time I was shivering inside a warm costume with a heavy tweed coat on top. In such weather one feels almost ill at the sight of these half-clothed people, who bear the unrelenting, furnace-like heat of summer with equal equanimity.

" Their animals are equally miserable and enduring ; some of the donkeys are so thin and small as to look scarcely capable of standing, much less of walking many miles with the owner and a load on top of them. At Pont du Fahs we found two or three ghastly backs with blood-soaked rags literally growing to them. One of them belonged to a poor old man ; half starved, shivering and almost naked. The saddle had completely worn away, giving no protection to the animal. We bought a new saddle for the donkey, taking the precaution of bringing the owner before the Khalifa and making him swear not to re-sell the saddle.

" At Medjez we came upon a poor little donkey mare with a string so tightly tied around the belly that it had cut right into the flesh, causing a deep suppurating wound each side. The original purpose of the string had been to support a rag covering the udder to prevent the foal sucking and thus not weaken the mother, so that she could work harder.

" On another day Marie Preste went by herself to Teboursouk. When she returned in the evening she told us she had found a donkey with its eye hanging out—the result of a blow—and another covered with sores and with its mouth bleeding, lying on the ground dying. . . .

" At Béja and Souk el Arba there were a number of native cattle for sale. They are pretty little beasts, rather the colour of Jerseys, scarcely larger than donkeys. They have shaggy long hair and are often pathetically thin, but are healthy and resistant. There is no tuberculosis amongst them, and no diseases other than parasitic complaints. As they stand up to the climate and endure starvation so much better than imported cattle, a movement is on foot to improve the native breed by selection, and to cease bringing in cattle from France.

". . . The committee at Bizerta is sincere, and one devoted member wears herself out scouring the town for scraps of food and taking them to the fourrière, where the wretched dogs captured by order of the municipal authorities are not provided with any food. Also, the municipality refuses to return dogs to their owners unless an anti-rabies inoculation certificate can be produced. The total cost amounts to 610 francs, and the S.P.A. Committee have often paid the amount out of their own pockets to assist poor owners to get their pets back."

The purpose of this contribution to *The Veterinary Record* is to make known to my colleagues where and how much cruelty really exists, and to try to enlist their help to counter it. I am not in any way authorised to make an appeal on behalf of S.P.A.N.A., but I *do* make it on behalf of the poor, starved, beaten, and miserable servants of man, which are themselves unable to make any appeal for mercy. Would readers care to have a collection box ?

TIGON DIES OF CHILL

Maud, a 17-year-old tigon, offspring of a tiger and a lioness, has died from a chill at Belle Vue zoo, Manchester. She is believed to have been the only tigon in Britain, and one of the only three in existence.

CLINICAL COMMUNICATIONS

By

P. CROSFIELD, M.A., M.R.C.V.S.,

CHIPPING NORTON

and

G. B. BROOK, D.Sc., F.R.C.V.S., F.R.S.E.,

LEAMINGTON SPA

1.—RUPTURE OF THE DIAPHRAGM IN A JERSEY HEIFER

Subject.—Pedigree Jersey heifer, two and a quarter years. Attested.

History.—Calved about September 24th, 1949, breech presentation of dead calf—described by cowman as a prolonged and difficult calving, considerable assistance being required. Appetite, condition and milk-yield failed progressively, from the first week *post-partum*. Seen October 14th, 1949, when the picture presented was typical of an acute traumatic reticulitis, *i.e.*, suppression of appetite, rumination and lactation, with laboured breathing and characteristic grunt. The heifer was placed on a ramp (Imrie), and seen again October 16th, 1949. The symptoms were slightly less marked, but it was clear that the choice was between rumenotomy and slaughter. The owner would not agree to operation unless the heifer was positive to the metal-detector, so this test was applied (by G. B. B.) with a positive result. Held ventral to the xyphoid process the detector emitted a quite strong note. At varying intervals this would fade and diminish only to return as strongly as before. During a phase when the response was positive the note could be abolished or reinstated by appropriate movement of the instrument. The temperature was 105° F. The heart sounds were almost inaudible on the left side, but louder than normal on the right side. Respiratory sounds were present over the right lung, deep and pronounced in keeping with the laboured and stertorous breathing, but were absent on the left side where one was able to hear indistinct but abnormal sounds usually associated with a gravely diseased lung (so called " tinklings " and other noises similar to those one would imagine could be emitted by movement of fluid-filled cavities). Rectal examination revealed nothing abnormal but caused the patient to grunt in a more distressing manner and was followed by straining, at once remarkable for its degree and duration. A pulse passing up the neck could be seen in both the distended jugular veins. There was no pectoral oedema. Immediate operation was decided on, and carried out on conventional lines, under paravertebral anaesthesia. During an early struggle, the rumen bulged through the operation wound ; on pushing it back, one's hand passed right forward without hindrance nearly up to the first rib ; it was thus clear that the diaphragm was ruptured, and that the symptoms had been produced by the pressure of abdominal viscera in the left chest. The heifer accordingly was destroyed.

Post-mortem examination.—This showed a complete rupture of the diaphragm on the left side. The torn edges were healed, showing that rupture had taken place some days at least before death. The recticulum, omasum and abomasum, together with the anterior part of the rumen, were forced into the chest, with resulting collapse of the left lung, and great pressure on the heart. The rugae inside the abomasum were intensely inflamed, and thickened up to ¾ inch. There was some degree of pleurisy. Prolonged and minute examination of the four stomachs and small intestine failed to show any particle of metal.

Discussion.—The condition appears to be one of great rarity. In the absence of penetrating metal, it is difficult to surmise what started the rupture in the diaphragm, but it seems logical to conclude that a small rupture occurred at the time of parturition, and was gradually increased by pressure of the abdominal viscera. The symptoms immediately prior to operation are interesting from the standpoint of differential diagnosis. The extensive dullness over the left lung area and the one-sided suppression of heart sound are not typical of the " foreign-body syndrome." If traumatic pneumonia assails the lung it usually involves the left organ but is generally confined to the lower third. If fluid invests the heart its sounds are usually suppressed whether they are studied from the left or the right, and obvious displacement of this organ is rare. The excessive and continued straining which followed rectal examination has not been observed in instances where a foreign-body subsequently has been incriminated. It was unfortunately not possible to utilise the metal detector during the *post-mortem* examination. Whether a piece of metal would have been revealed by such a survey is a matter for speculation, but we would emphasise that, in general, it is unsafe to rely upon a positive sound which undergoes crescendo and diminuendo. In several instances such a sound has been found to be due to small stones in the recticulum, movement of which apparently carries these bodies into and out of the magnetic field. In such cases the maximum note emitted is weak and faltering. In the case of the cow under discussion we considered the maximum response to be far too strong to indicate other than a metal object. The *post-mortem* results tend to underline the observation that rumenotomy is as much an exploratory procedure as a measure to remove an offending body.

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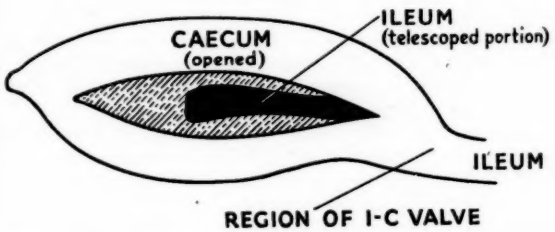
2.—INTUSSUSCEPTION OF ILEUM THROUGH THE ILEO-CAECAL VALVE INTO THE CAECUM

Subject.—Child's Pony, 14·3, 19 years.

History.—Turned out to graze April 16th and 17th, 1949. Noticed by owner to be uneasy at 10.30 a.m., April 18th, 1949, and " colic drink " administered. As there was no improvement, the case was seen by one of us (P. C.) at 1 p.m. The history and symptoms being entirely consistent with a flatulent colic, carbachol 1 c.c. and pituitrin 3 c.c. were given intramuscularly, with resultant evacuation and flatus. The pony seemed easier when seen at 4 p.m., but was reported worse at 7 p.m., when the owner gave another " colic drink," which again afforded temporary relief. Morphine gr. III was given subcutaneously at 10 p.m. with some effect. Pulse-rate and temperature now began to rise, although there was at no time really acute pain. Symptoms gradually grew more pronounced during the morning of April 19th, 1949, in spite of chloral hydrate 6 drachms intravenously, accompanied by 4 c.c. pituitrin intramuscularly, and a second opinion (G. B. B.) was sought. The rectum and colon were by now empty, and it was possible to palpate per rectum a hardened mass well forward on the left side of the abdomen, pressure on which was much resented. It was

decided, as symptoms now pointed to the establishment of peritonitis, that really drastic treatment was essential. The pony was anaesthetised deeply with chloral hydrate intravenously, and carbachol 3 c.c. with pituitrin 5 c.c. administered by the same route. The pony, however, died about 30 minutes later, it being presumed that the liver, already saturated with toxins, was unable to deal with the chloral.

Post-mortem Examination.—This revealed that some 3 ft. of the ileum had intussuscepted through the ileo-caecal valve into the caecum, resulting of course in complete occlusion of the bowel, intense hyperaemia, and commencing necrosis of the parts.



Discussion.—It is interesting to speculate as to the point in the illness at which the intussusception occurred—was it the cause or the effect of the flatulent colic, or was it induced by the initial considered and restrained use of injections ? The case is recorded as it is unique in the experience of either of us, nor can we recall having seen it mentioned in the literature.

ABSTRACTS

[Tuberculosis. The Control of an Infectious Disease. Francis, J. (1949.) *Lancet.* **257.** 549.]

In this article, Francis has set out to establish a case for the use of B.C.G. vaccine as an immunising agent against tuberculosis in man. He has been prompted to do so because of the cautious attitude adopted in this country towards its use until quite recently, and his main object is to dispel some of the doubts cast upon its value by Professor G. S. Wilson (1947. *Brit. Med. J.* **2.** 855).

Wilson's main thesis is that on the one hand there are no adequate controlled trials with statistically significant results showing that B.C.G. is effective, whereas, on the other hand, there is a fall in non-pulmonary tuberculosis following the pasteurisation of milk or the eradication of bovine tuberculosis. Francis, however, points out that the latter events are not interdependent and contends that the more effective the measures taken to protect children from tuberculosis the more necessary does immunisation become. After stating that quite different standards of evidence are used when discussing the value of B.C.G. and other immunological procedures in man, such as small-pox and plague vaccination, he quotes the statistical evidence derived from the results of four controlled trials recently reported which demonstrate the protective value of B.C.G. The support obtained from experiments in animals is mainly to confirm that, following the introduction of B.C.G. they become allergic, a state which is regarded as being associated with an increased resistance to infection.

The author questions the statement made by Wilson that the need for a method of immunisation against tuberculosis is exaggerated and emphasises the need for an intensive campaign for the eradication of the most important single cause of death in Great Britain.

[In connection with the statistical evidence in support of B.C.G. it may be well to quote from an Editorial article appearing in the *British Medical Journal* (1947) which states that " a more difficult subject in which to produce statistically unassailable evidence is scarcely conceivable."—*Abstractor.*]

S. J. E.

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[Studies on Bovine Tuberculosis in the Australian Environment. Gregory, T. S. (1949.) *Austral. vet. J.* February. Pp. 17–26.]

This article is a general review with a very useful comparative table showing the various types of tuberculin and tuberculin test used in cattle. It is concluded that P.P.D. tuberculins prepared in a relatively pure state from heat-killed cultures in synthetic media appear to be satisfactory for field use. The greater purity of these " Purified Protein Derivatives " should, theoretically, lead to fewer non-specific reactions and it is probable that the potency of solutions is capable of more accurate estimation, gravimetrically, in terms of weight of P.P.D. per ml., than by comparison biologically, with an approved O.T. standard in sensitised guinea-pigs and cattle. Biological testing of tuberculins by routine methods where small numbers of animals are used is inaccurate ; nevertheless it is wise to retain it as a supplementary procedure where estimations of the potency of solutions are based on tuberculo-protein content in terms of weight of P.P.D. per unit volume. There is always the possibility that a variation in method of production, or prolonged storage, might partially denature the active principle or affect specific chemical groupings without any change being evident in a chemical analysis. Cattle as well as guinea-pigs should be used for biological tests.

J. F.

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[A New Approach to the Treatment of Bloat in Ruminants.

Quin A. H., Austin, J. A., & Ratcliff, K. (1949.) *J. Amer. vet. med. Ass.* **114.** 313-314.]

The authors quote the work of Clark ((1948.) *Onderstepoort J.* **23.** 389–393) who showed by *in vitro* tests that turpentine exerts its curative action in bloat by *increasing* surface tension. This work suggested the trial of anti-foaming agents in the treatment of bloat, and the authors report trials of a preparation containing highly polymerised methyl silicone. The preparation was issued to 34 veterinarians for field trial and 155 cases of bloat in cattle were treated, either by intra-ruminal injection, by drench or by stomach tube. Some cases received other treatment in addition. Perfect recovery occurred in 115 cases and data indicated that treatment was most effective by intra-ruminal injection.

H. E. H.

FOWL PEST SITUATION

The Earl of Huntingdon, Parliamentary Secretary to the Ministry of Agriculture, stated at the inaugural lunch of the National Poultry Show at Olympia, London, that it was hoped to relax early in the new year the restriction on the movement of poultry imposed because of the prevalence of fowl pest.

Six outbreaks of fowl pest were confirmed in Scotland, bringing the total up to 197. There were two in North Uist, two in Vatersay—an island to the south of Barra in the Outer Hebrides—one in Mallaig and one in Skye. The total number of birds destroyed was 215 and the amount payable in compensation £243. In all there have been 13,345 birds slaughtered, and the total amount of compensation payable is £11,609.

QUESTIONS AND ANSWERS

The submission of questions for inclusion in this column will be welcomed; they can relate to any aspect of veterinary work. For purposes of record, each question is numbered, and those submitting questions are required to furnish (not for publication) name and address.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Diagnosis of Pregnancy

Q. 333.—(*a*) *Diagnosis of pregnancy in the bitch has caused confusion from time to time. Please advise* (*i*) *the earliest stage to detect pregnancy by palpation of the abdomen,* (*ii*) *the optimum time to examine in the gestation.* (*b*) *In the cow and heifer is six weeks after service a successful time to carry out routine pregnancy diagnosis—what are the signs at six weeks, nine weeks and twelve weeks?*

A.—(*a*) The only period when *early* pregnancy diagnosis can be made by abdominal palpation in the bitch is that period when the uterus is enlarged only in the areas of foetal implantation as a series of tense swellings along the uterine horns with constricted areas in between, *i.e.*, between the 21st and 35th days. J. C. Wright states that he has detected pregnancy in the thin bitch as early as the 18th day but for practical purposes the 21st day is generally considered to be the earliest time for diagnosis and that only in the fairly thin breeds of small to medium size gravid with several foetuses. The foetal units are then oval in shape and in the fox-terrier about ½ inch in diameter. In the big breeds or in the fat subject it may not be possible until up to the 28th day and in subjects with only one or two foetuses far up the uterine horns under the costal arch it may be impossible even then.

The optimum time is between the 28th and the 32nd days. After the 35th day the uterine horn fills out between the foetal units and becomes flaccid and difficult to distinguish from other abdominal contents or from a moderate degree of pyometra. By the 32nd day foetal units are spherical in shape and in the medium-sized bitch about the size of a golf ball. They must be differentiated from faeces in the colon, using an enema if necessary. In the case of a fat, tense nervous subject, or one with few foetuses, if early diagnosis is vital, anaesthesia (*e.g.*, pentothal) may be used to give abdominal relaxation.

Failing detection of pregnancy in this period the bony skeleton of the foetus is not apparent on palpation until after the 49th day from which time X-ray also could be used if palpation yielded negative results. It is unwise, however, to subject a pregnant bitch to repeated or prolonged exposure to X-rays.

(*b*) Although some veterinarians are prepared to express an opinion regarding the existence of pregnancy six weeks after service, eight weeks is generally regarded as the time when a diagnosis can be made with a high degree of certainty. Apart from a well-developed corpus luteum, there may be no other evidence of the existence of pregnancy at six weeks. At nine weeks the uterus is quite distinctly enlarged and may be about the size of a small lemon. At twelve weeks the enlargement extends up to and often beyond the brim of the pelvis, but the whole organ is still fairly firm and has not tended to fall into the abdominal cavity to any marked extent. At this stage it may be as large as a pint milk bottle.

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Treatment of Contagious Vaginitis

Q. 334.—*Is there any specific treatment for contagious vaginitis in cattle? We have had a serious outbreak in a herd and have tried various methods of treatment without success; these were protargol sticks, euflavine and iodine douches. How long should the bull be with-held from the cows to ensure that any carrier infection which he may have will die out, or is there any specific method of killing off any such infection in the bull?*

A.—The significance of contagious granular vaginitis as a cause of infertility in dairy cattle has been a matter of conjecture for some years, but experience indicates that it plays no particular part as a cause of infertility.

The clinical manifestations of this condition, particularly rife in Channel Island cattle, tend to disappear in the later stages of pregnancy and reappear eight to ten weeks after parturition, with no history of service to account for its occurrence. It would appear to be physiological in origin and not associated with the transmission of any infection from the bull.

The respondent knows of no treatment which will give certain positive results in clearing up this condition, but since, in his experience, it has no effect on fertility, treatment would appear to be unnecessary.

On the other hand, vesicular vaginitis (bull burn) is an acute contagious venereal disease, the severe symptoms of which require no description. Rest from service is essential, and the disease being self-limiting, that alone will suffice in clearing up the condition in the cows. Where pain is manifest, bland applications to the vagina may be used. Rest from service should extend for a period of one month. In the bull, in particular, return to service is often associated with recurrence of symptoms.

Even vesicular vaginitis does not necessarily make the cow infertile to the service at which it had become infected. The writer has experienced a number of "burned" cows which proved to be fertile to that particular service.

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Gonadectomy in the Guinea-Pig

Q. 335.—*I wish to spay a young guinea-pig. Can you please compare technique with that used in spaying kittens and state what method of anaesthesia is best? Also is castration of the male guinea-pig possible? Technique? Anaesthesia?*

A.—The respondent has spayed numbers of guinea-pigs for experimental purposes and has found ether anaesthesia very satisfactory. No premedication is necessary. The technique of ovariectomy is very similar to that for kittens and the same aseptic precautions are necessary. A separate incision is made for each ovary, the position of the incision being somewhat more cranial than in the kitten, *i.e.*, nearer to the last rib. When large numbers of animals are being operated on, the respondent uses a small thermocautery to remove the ovary, which dispenses with the necessity of applying ligatures. The abdominal wall is closed by one or two sutures, and the skin closed by several interrupted sutures. Healing of the wound is rapid and usually no dressing is necessary.

The respondent has had no personal experience with castration in the male guinea-pig. For experimental purposes this operation is, however, carried out under ether anaesthesia through a short mid-line abdominal incision.

British Friesian's World Record.—A British Friesian cow, Manningford Faith—Jan Graceful, has broken the British record for milk production, previously held by a Shorthorn. By Thursday of last week she had yielded 224,003¼ lb. in seven lactations. She is not only the first British cow to give 100 tons of milk in a lifetime but she is the only cow in the world with five consecutive yields above 30,000 lb. (3,000 gallons) in not more than 365 days. The cow was bred by Mr. George M. Odlum and has spent all her milking life in the Elmwood herd of Messrs. Jenkinson (now Elmwood Farms, Ltd.), in Wiltshire.

REPORTS

[**New Zealand Department of Agriculture.** Extract] from Annual Report for 1948.]

Aerial Top-dressing.—During August, 1947, an experimental aerial top-dressing with cobalt sulphate in the form of a saturated solution was successfully carried out in co-operation with the Public Works Department. For this purpose 1,800 acres of mainly hilly, bush-sick country near Taumarunui was selected. Top-dressing was at the rate of 20 oz. cobalt sulphate per acre, as previous experiments have indicated that on flat country such a rate gave protection against bush sickness for a number of years. Subsequent analyses of pasture samples have shown a satisfactory increase in cobalt content. Pasture cobalt will be checked at intervals to determine the length of time over which the top-dressing remains effective on the country selected for the experiment.

The cost of aerial application worked out at 7d. per acre, which compares favourably with an estimated 1s. per acre for top-dressing by hand. Aerial distribution is considered to offer a satisfactory solution to the cobalt top-dressing problems of hill-country farmers.

Blackleg in Sheep following Vaccination.—A mortality in sheep from gas-gangrene infection following vaccination with blackleg vaccine was investigated in October, 1947. Of 950 sheep vaccinated on the same day, 88 died from blackleg (*Cl. chauvoei* infection) originating at the inoculation site behind the elbow.

The vaccine was shown to be uncontaminated and was therefore not the source of infection, which was believed to originate from contamination of vaccine or needle and syringe by dust from the wool-shed floor and pens in which the sheep were held during vaccination. This possibility was suggested by the fact that the vaccine was transferred to an open container when filling the syringe and that wool-shed dust was later found to contain 39,000 blackleg spores per gramme. Ten milligrammes of the dust, the smallest dose tried, killed a sheep from blackleg within 48 hours. Investigation of this mortality suggested that it was unlikely that latent blackleg spores had been activated by damage caused from inoculation of the vaccine. In other work on lethal doses of blackleg culture it was found that sheep are much more susceptible than guinea-pigs.

Sheep-dipping Experiments.—An attempt was made last season to eradicate ticks and lice from sheep, using a single treatment with a standard " Gammexane " preparation in a power spray unit. When the sheep were examined before treatment, ticks were present in moderate numbers, especially on the unshorn lambs. Biting lice were also present in considerable numbers on the ewes. Soon after one mob of lambs had been dipped a heavy shower of rain fell, and as the kill was unsatisfactory in this group the whole flock was redipped. The entire flock had been maintained completely isolated from all neighbouring flocks either by double fences, roads, or ditches. The flock was examined carefully at shearing-time, nine months after dipping, and no ticks were detected, but a light to moderate louse infestation was detected on a small proportion of the ewes.

A further attempt at eradication was made during 1948 and samples of dip wash were taken at intervals during the operation. The samples are being examined by the manufacturers to determine the rate of exhaustion of the insecticide in the power spray unit for comparison with that observed in orthodox dipping-baths.

[**The Science of Relationships.** III—Report of Conference on *Rural Life at Home and Overseas.**

The Rural Life Conference held at High Leigh, Hoddesdon, Herts, from January 11th to 14th, 1949, followed previous conferences organised by the Church Missionary Society. It was designed to bring into closer association those at work in rural areas overseas and men and women in Great Britain who are concerned to promote the welfare of country people.

The general theme of the conference was the Peasant or Family Farmer in a Changing World. The general meetings were of a highly informative nature. The first was based on a paper specially written in Africa for the Conference by Dr. James Welch, Chief Education and Welfare Officer of the Overseas Food Corporation ; Mr. A. J. Wakefield of the Food Corporation was present and dealt with the questions which the paper provoked as well as the various views expressed in the discussion on the inevitability of large scale mechanisation. The second was an economist's analysis of the Scale of the Agricultural Unit by Mr. J. L. Maxton. Finally Mr. Kurt Hahn gathered together the personal problems of individual development which had emerged in the minds of Conference members into an address on " The Loyalties by which we Live."

* Published by Rural Life at Home and Overseas from C.M. House, 6, Salisbury Square, London, E.C.4. Price 2s.

REVIEW

[**Experimental Surgery.** By J. Markowitz, M.D.E., M.B., PH.D. (Second Edition). Pp. xiv + 516. with 330 figures. Published by Baillière, Tindall & Cox, 7 & 8, Henrietta Street, London, W.C.2. Price 40s. net.]

The first edition of this work received notice in our columns at the time of its appearance. In so fluid a field as that of experimental surgery it is not surprising that the author has decided upon a second edition. It says much for the excellence of the work that so little of the original text has been modified and that the changes in the second edition are almost entirely additions made necessary by modern advances.

A most striking feature in comparing these two works is to note that much that at the time of the appearance of the first edition was considered, from the practising surgeon's standpoint, to be of purely theoretical interest and to be solely the realm of the experimental physiologist has now come to be accepted as standard (if specialised) clinical surgical practice, notable examples being re-vascularisation of the heart and surgical correction of congenital heart disease (*e.g.*, " blue babies ").

Modifications noted by the reviewer include enlargement of the section dealing with pneumonectomy, the operation of nephrectomy is more fully described and illustrated, much newer information is included in the chapter dealing with experimental intestinal obstruction, resection of the oesophagus is given greater attention and includes recent techniques.

The chapter dealing with experimental peritonitis has been expanded and newer work made possible by the introduction of antibiotics is described. The very important subject of shock is fully dealt with and is brought into line with modern concepts, including the role of vaso-

dilator material (V.D.M.) in the production of shock. Sections on the crush syndrome and surgical shock are included, giving details of work based on air raid casualties, followed by a description of the experimental production of traumatic shock.

It is unnecessary to list all the advances noted in this new edition but the veterinary reader must note with interest that transplant of the ureters into the intestine has been successfully performed in veterinary clinical practice, and that recent advances in bone surgery make use of the vitallium plate method.

The book cannot fail to be of use to those members of the veterinary profession with a particular interest in surgery. The detailed description of techniques of experimental operations may well prove of considerable value when any surgical procedure out of the usual run is to be attempted.

The book is well produced and copiously illustrated, and in the latter connection the lighter inking (if this is common to the whole edition) gives vastly improved detail in both photographs and diagrams.

ROYAL COLLEGE OF VETERINARY SURGEONS

Membership Examinations, December, 1949

List of Successful Candidates

London

First Examination

Both subjects

Millar, R. O.
Simons, M. A. P.

One subject

Baldwin, I. J.
Basinger, D.
Beaumont, J. T.
Douch, J. A.
Eden, R. M. G. (B)
Hambrook, C. L. E.
Keep, M. E. (C)
Kermath, D.
Morgan, D. B.
Nelson, D. G.
Olive, H. W.
Shaw, D. L. (C)
Turner, E. H.
Williams, J. R. L. (C)

(C) denotes credit in Chemistry.
(B) denotes credit in Biology.

Second Examination

Both subjects

Carnaghan, R. B. A.
Cunningham, J. A.
Manton, V. J. A. (A)
Simpson-White, P. H.

One subject

Barley, A. P.
Barnsley, D. G. C.
Cochrane-Dyet, I. G. C.
Dickens, P. S. E. M.
Epps, H. B. G.
Ford, G. K.
Goodsell, P. R.
Herbert, W. J.
Humphreys, M. J.
Jones, M. D. Berwyn.
Keyner, I. F.
Langford, S. H.
Larkin, P. J.
Lloyd, E. R. O.
Michael, J. R.
Owen, J. H.
Perryman, Miss P. J.
Redmond, M. R.
Rodgers, M. J.
Stephens, J. M.
Tucker, Miss J. W.

(A) denotes credit in Anatomy and Histology.

Third Examination (revised syllabus)

Pathology only

Bateson, W. B.
Beach, J. E.
Corder, J. (Credit)
Cox, G.
Fumpston, W. A.
Gibson, Miss M. A.
Gregory, B. M.
Griffiths, A. V.
Howard, R. W.
Jacques, P. A.
Jenkins, P. A.
Minson, Miss J. M.
Morgan, T. L. A.
Owen, D. C.
Pittaway, E. M.
Price, C. J.
Rosser, I. J.
Simpson-White, J. N.
Spurry, J. R.
Stokoe, H. P.
Tuckett, P. C.

Hygiene only

Ahmad, A.
Aitken, Miss E. A.
Bailes, Miss J. A. (Credit)
Ball, Miss J. B.
Bevan, T. G. (Credit)
Bowley, M. I.
Boyde, C. (Credit)
Boys-Stones, P. A.
Brain, J. R. (Credit)
Brockis, D. C. (Credit)
Colegrave, A. J. (Credit)
Cook, T. F.
Cooper, B. S. (Credit)
Creyke, G. H. (Credit)
Cripps, J. H. H.
Crooks, J. L.
Davies, A. J. (Credit)
Davies, D. R.
Davies, W. E. O.
Dring, J. C. (Credit)
Edwards, Miss B.
Evans, H. T. J.
Faull, W. B.
Felgate, C. A. G. (Credit)
Fishwick, R.
Fowler, N. G. (Credit)
Franks, P. W.
Gilmore, J. D.
Hawksley, M. B. (Credit)
Hoe, Miss C. M.
Holcombe, R. B. (Credit)
Holton, J. A. (Credit)
Howell, D. G.
Hutchings, D. A.
Jenner, F. H.
Johnson, Miss P. L.
Jones, B. V.
Jull, D. J.
Kennea, T. L.
Lawson, M. R.
Mace, J. W.
Peacock, R.
Peters, W. G. D.
Prasad, Y.
Rees, W. H. G.
Rham, G. G.
Sainsbury, D. W. B. (Credit)
Shattock, G. (Credit)
Stokes, S.
Symons, G. B. (Credit)
Taylor, J. H.
Thomas, H. J. D.
Thomson, J. McC.
Thoumine, R. H.
Wallace, H. G.
Waters, P. J. (Credit)
Wickenden, P. F.

Fourth Examination (old syllabus)

Lakin, C. N. S.
Luckin, K. G.
Sladden, I. E. T.
Spalding, V. T.

(To be continued)

QUESTIONS IN PARLIAMENT

Veterinary Surgeons

Mr. Collins (December 8th) asked the Minister of Agriculture if he is aware that the shortage of veterinary surgeons employed by his Department in Somerset is such that food production is retarded and farmers are often unable to have obligatory tests carried out; and what action he will take to obviate this difficulty.

Mr. T. Williams: There is at present a general shortage of veterinary surgeons for both official duties and private practice. There is, however, little delay in carrying out official tuberculin tests in Somerset, though I understand that a number of veterinary surgeons have waiting lists of clients anxious to have the preliminary private tests of their herds made. With regard to the last part of the Question, arrangements have already been made, as part of the policy embodied in the Veterinary Surgeons Act, 1948, to increase the flow of graduates into the profession, but naturally it will be some time before the full effect of these measures can be felt.

Mr. Collins: Can my right hon. Friend give any estimate of when he hopes that the demand for veterinary surgeons will be met?

Mr. Williams: I am afraid I cannot because that depends on the rate of recruitment of new students and their departure from the various universities.

Lieut.-Commander Braithwaite: Has not the treatment of the doctors had a deleterious effect on recruitment for the veterinary profession?

Mr. Williams: I should think that it has helped considerably.

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Calf Subsidy Scheme

On the motion to approve the Draft Calf Rearing Scheme, Mr. Dye (December 8th) asked if certification for subsidy could include a condition that the farmer should de-horn them, thus encouraging the farmer to go in for de-horning painlessly.

Mr. T. Williams: I do not think that this is the right moment for any form of compulsion with regard to the calf subsidy scheme. What we want is more beef. Anything that we may do to discourage the possibility of calves being reared for beef would militate against the national interest. I believe in my hon. Friend's general thesis that calves ought to be de-horned for their own safety and that of their owners, but I am certain that this is not the time to do it. In any case it does not happen to be in the Order, so whatever my personal sympathies may be I am afraid that it cannot be done.

Fowl Pest (Hungarian Poultry)

Mr. Spence (December 8th) asked the Minister of Agriculture what inspections are carried out on poultry carcases delivered to this country from Hungary; what instances of fowl pest have been discovered in these consignments; and what action his Department takes when such cases are reported.

Mr. T. Williams: Apart from the inspections by the Ministry of Food and local authorities, arrangements were made, a few months ago, for samples to be taken from consignments of Hungarian poultry so that they could be tested for the presence of fowl pest. Only one consignment of Hungarian poultry has been received between the end of July, when the arrangements were made, and the beginning of this week. Fowl pest was not found to be present in the samples taken from that consignment.

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Slaughter of Animals

Mr. Rankin (December 8th) asked the Minister of Health if he will take the necessary steps to prohibit the slaughter of animals in this country by any method other than the humane killer.

Mr. Blenkinsop: My right hon. Friend can hold out no prospect of legislation for this purpose.

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Animals (Slaughter)

Mr. Peter Freeman (December 7th) asked the Minister of Food how many of each variety of animals of which he has records were killed for human consumption in this country during 1948; how many and what percentage were slaughtered by the use of the humane killer.

Mr. Strachey: For the animals slaughtered in Government slaughterhouses and bacon factories, I would refer my hon. Friend to the reply given to him by my right hon. Friend the Parliamentary Secretary on June 29th, 1949. In addition, licences were issued for self-suppliers to slaughter 666,080 pigs, 6,704 sheep and 1,643 calves. It is not known for how many of these a humane killer was used.

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Research (Expenditure)

Mr. Dodds Parker (December 5th) asked the Lord President of the Council whether he will give an assurance that in connection with the programme of expenditure cuts now under consideration, no steps will be taken to reduce the valuable work at present being undertaken by the Agricultural and Medical Research Councils, the Department of Scientific and Industrial Research, and the industrial research associations associated therewith.

Mr. H. Morrison: I could not agree that these services should be immune from the cuts which have to be made in Government expenditure in general, but I share the hon. Member's desire that they should be spared as much as possible from reductions in their current activities. We shall seek to effect such savings as may be required mainly by slowing down the rate of future capital expenditure.

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Cows (Transport and Slaughter)

Mr. Symonds (December 5th) asked the Minister of Food if he is aware that a number of reject cows were sent by his Department on October 18th by rail from Gowerton, Glamorganshire, to Nottingham for slaughter; and if he will arrange in future for such aged animals to be slaughtered at the nearest slaughterhouse and the carcases despatched to the desired destination.

Dr. Summerskill: Yes, Sir; the movement took place at a time when more cows were being sent to markets in the south-western area than could be killed there. Nottingham was the nearest place where they could be dealt with; they arrived in good order and were killed on the same day. Normally we kill such animals at the nearest slaughterhouse that can deal with them quickly.

Mr. Symonds: Would my right hon. Friend agree with the general principle that long journeys for aged animals are quite unnecessary?

Dr. Summerskill: Yes, Sir.

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Agenised Flour

Sir E. Graham-Little (December 5th) asked the Minister of Food in what proportion of cases is the national flour supplied for national bread bleached by the gas known as agene; whether he is aware of the danger of poisonous effects arising from this gas and that its use has now been forbidden in the United States of America; and if he will take similar action in the provision of our national bread.

Mr. Strachey: In the year 1948, 95·5 per cent. of national flour was treated with agene. As to the second and third parts of the Question, I hope to be able to make a statement soon on the findings of the Scientific Committee under the chairmanship of Sir Wilson Jameson which has, as the hon. Member knows, been reviewing the whole question of this and other flour improvers. But I should point out that even in the United States, under the most rigorous tests, agenised flour has not been found to have any harmful effect upon human beings.

NOTES AND NEWS

Diary of Events

Dec. 21st.—Meeting of the Section of Comparative Medicine, Royal Society of Medicine, 1, Wimpole Street, W.1, 5 p.m.

Dec. 21st.—Meeting of the Association of Veterinary Teachers and Research Workers, at Leahurst, Wirral, 10.30 a.m.

Dec. 30th.—Annual Dance, Dumfries and Galloway Branch V.V.B.F. Ladies' Guild, at Dumfries (Cairndale Hotel).

1950.

Jan. 6th.—Meeting of the Southern Regional Group of the Association of Veterinary Teachers and Research Workers, at the Royal Veterinary College, Camden Town, N.W.1, 2 p.m.

Jan. 13th.—R.V.C. Students' Society Annual Ball, Grosvenor House, Park Lane, W.1.

Jan. 18th.—Meeting of the Southern Counties Division, N.V.M.A., at Southampton (Polygon Hotel), 6 p.m.

Next Meetings of Council and Standing Committees, N.V.M.A.

(*Committees at 36, Gordon Square, W.C.*1)

Wednesday, February 8th

11.0 a.m. Parliamentary and Public Relations Committee.
2.0 p.m. Organising Committee.
4.15 p.m. Home Appointments Committee.

Thursday, February 9th

10.0 a.m. Veterinary State Medicine Committee.
2.0 p.m. General Purposes and Finance Committee.

Friday, February 10th

11.0 a.m. **Council Meeting** at the Connaught Rooms, Great Queen Street.

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PERSONAL

Retirement of Dr. F. C. Minett, C.I.E.

Our readers will learn with interest that, though he is not relinquishing veterinary activities, Dr. Francis C. Minett, C.I.E., is now on leave in this country—residing in the vicinity of Cambridge—pending his retirement from the position of Animal Husbandry Commissioner to the Government of Pakistan. It will be recalled that in October, 1947, after eight years' valued service as Director of the Imperial Veterinary Research Institute at Muktesar, Dr. Minett took the post of Animal Husbandry Commissioner after having given his option for Pakistan when the country was divided, undertaking a survey of the animal husbandry conditions in East and West Pakistan.

As a pleasing addendum we may intimate that Dr. Minett recently was elected Foreign Corresponding Member of the Académie Vétérinaire de France, having previously been elected in a similar capacity to the Belgian Royal Academy of Medicine.

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Birth.—Johnston.—On December 8th, 1949, at the Maternity Hospital, Northallerton, to Winifred (*née* Crawford), wife of T. Johnston, M.R.C.V.S., D.V.S.M., a son—both well.

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Forthcoming Marriage.—Warren—Chambers.—The engagement is announced between W. Warren, M.R.C.V.S., younger son of Mr. and Mrs. J. G. Warren, Wellingtons, Southminster, Essex, and Natalie Margaret Chambers, younger daughter of the Rev. and Mrs. G. B. Chambers, Carbrooke Vicarage, Watton, Norfolk.

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R.C.V.S. OBITUARY

Canning, David Dunlop, M.R.C.V.S., D.V.S.M., Divisional Inspector, Animal Health Division, Ministry of Agriculture, 48-50, St. Giles Street, Northampton. Graduated Glasgow, July 16th, 1925. Died December 4th, 1949; aged 46 years.

Funeral of the Late Mr. David D. Canning, M.R.C.V.S., D.V.S.M.

The interment took place at Woodside Cemetery, Paisley, on December 7th, of Mr. David D. Canning, late Divisional Inspector for Northamptonshire, of the Animal Health Division of the Ministry of Agriculture and Fisheries.

After a service at his parents' house in Paisley, a large number of relatives and friends gathered around the graveside to pay their last respects, the chief mourners being Mr. Canning (father), Mr. P. Canning (brother), and a brother-in-law. The services were conducted by the Rev. Mr. Sharp, of the High Parish Church, Paisley.

Amongst his veterinary colleagues were Mr. W. D. Macrae (representing the Ministry of Agriculture), Mr. W. L. Weipers (representing the University of Glasgow Veterinary School), Mr. Alex. Thomson (representing the West of Scotland Division of the N.V.M.A.), Captain W. Watt, Major J. Gillray McGregor, Messrs. W. Grant and Alex. Pottie and Major D. S. Rabagliati.

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PROFESSOR WINTERS WELCOMED

Mr. G. Chipperfield, Chairman of the British Oil and Cake Mills, gave a dinner party at Grosvenor House on Monday, December 5th, to welcome Professor L. M. Winters, Professor in charge of the Animal Breeding Department, University of Minnesota, U.S.A., who is paying a visit to this country.

Mr. H. W. Steele-Bodger made a witty speech in replying for the guests, who included many connected with veterinary and animal husbandry work in this country. Amongst these were: Dr. W. S. Gordon, Professor W. I. B. Beveridge, Dr. John Hammond, Professor N. J. Scorgie, Dr. N. S. Barron, Dr. W. P. Blount and Mr. W. G. R. Oates.

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GRADUATED A.I. FEES FOR COLOUR MARKING BEEF BULLS

In his speech at the opening of the Smithfield Show, Mr. Tom Williams, the Minister of Agriculture, intimated that when the free artificial insemination service for colour marking beef bulls comes to an end in April next, farmers will not be asked to pay the full commercial rate of 25s. for services with semen from these bulls, but that a reduced fee of 12s. 6d. would be charged.

Mr. Williams said that the dairy herd was one of the main sources to which farmers should look for an increased supply of beef stores. The free service had been criticised on the grounds that farmers did not appreciate something for nothing. During the last year of the scheme, beginning next April, they would get, if not something for nothing, at any rate a service at a very attractive rate. He hoped that, having got used to paying for this service, farmers would still continue to use it as freely as hitherto when the full commercial fee had to be charged in 1951.

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ASSOCIATION OF AGRICULTURE

Lord Shrewsbury on Need of Agriculture

The necessity of achieving a more reasonable balance between agriculture and industry in Britain was emphasised by Lord Shrewsbury, President of the Association of Agriculture, at a luncheon last week. The object of the Association is to promote a better understanding between town and country.

"It is now nearly two years," said Lord Shrewsbury, "since our Association began to intensify its educational work under the General Secretaryship of Mr. Alexander Hay, and I am able to say that what we have done since he joined us is beginning to bear good fruit. The teaching profession has welcomed our endeavours in support of its desire to make a more realistic approach to the subjects of biology, geography and history, and our programmes of conferences, farm visits, etc., are going forward with a confidence born of a successful experimental period."

Lord Shrewsbury said he feared that Great Britain's days of cheap food imports and relatively high priced exports of manufactured and capital goods had gone for ever. Unless we could materially alter the ratio between our urban and rural populations and their activities we should come perilously near to disaster.

The Association is to publish shortly two articles describing the contribution which the veterinary surgeon in country practice makes to the health and food supplies of the townsman.

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"INTERNATIONAL CONFEDERATION OF THE HORSE"

"A meeting was called in Paris recently by the Society of French Farmers, under its President, M. Cornault, to discuss what could be done to arrest the rapid decline of the horse and horse breeding in all countries," reports *Horse and Hound* in its issue of December 3rd, and continues: "The Royal Agricultural Society of England and the British Horse Society were represented by Lord Digby, and 19 other countries sent representatives.

"It was decided to form an International Confederation of the Horse which would not only do all in its power to arrest the decline of the horse but would take up any technical or welfare matters connected with its protection and with the maintenance of breeding. Lord Digby suggested that a sub-committee of the big International and European Confederation for Animal Husbandry might perhaps handle these matters, but voting was strongly in favour of setting up a separate organisation.

"M. Cornault was elected President, Veterinary Surgeon Carnat (Swiss) was elected Secretary General, and the Society of French Farmers put its offices at the disposal of the International Confederation of the Horse. Fuller details of the constitution of this Confederation will be given after the draft copy has been finally agreed at Strasbourg or Paris in January, 1950."

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

PENICILLIN IN THE CONTROL OF SWINE ERYSIPELAS

Sir,—I was interested to read the paragraph on this subject in to-day's *Record*, as I have on three occasions within the last six months made use of penicillin in the absence of specific serum. In each case the dose used was 100,000 units in aqueous form, and in pigs of eight to nine score, recovery was spectacular and complete with a single dose.

Yours faithfully,

Damory Lodge, Blandford, Dorset. *December 10th*, 1949.

Walter B. Forrest.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Parasitic Mange*	Sheep Scab	Swine Fever
Nov. 16th to 30th, 1949	11	2	17	—	—	—
Corresponding period in—						
1948	3	7	1	—	6	1
1947	7	—	268	—	2	1
1946	5	2	—	—	5	4
Jan. 1st to Nov. 30th, 1949	217	15	558	—	34	5
Corresponding period in—						
1948	101	11	254	1	60	27
1947	111	103	2065	1	76	34
1946	87	37	—	7	90	340

Note.—The figures for the current year are approximate only.

*** Excluding outbreaks in Army Horses.**

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at November 30th, 1949, was as follows:

England	Wales	Scotland	Total (Great Britain)
18,380	13,691	12,128	44,199

Advertiser's Announcement

Burroughs Wellcome & Co. announce that the price of 'Wellcome' brand Concentrated Lamb Dysentery Serum is 28s. (subject to discount) for a bottle of 50 c.c. (25 doses). 'Wellcome' Lamb Dysentery Serum continues to be available in bottles of 100 c.c. (20 doses) at 22s. 6d. (subject), but the Concentrated Material will be supplied to meet all unspecified orders.